

## REMARKS

As an initial matter, Applicants wish to thank Examiner Steadman for the helpful interview conducted with Applicants' representatives on November 16, 2007, in which proposed claim amendments were discussed.

Claims 1-13, 17-25, 27-36, and 39-44 are pending. Claims 2-13, 17-25, and 27-36 stand withdrawn as drawn to non-elected subject matter. Claims 1 and 39-44 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1 and 39-44 also stand rejected under 35 U.S.C. § 112, first paragraph, for lack of written description and insufficient scope of enablement. Claims 1 and 39-44 further stand rejected under 35 U.S.C. § 102(b) for anticipation by Armistead et al. (U.S. Patent 5,978,740; herein "the '740 patent"), and under 35 U.S.C. § 103(a) as being unpatentable over the '740 patent in view of *In re Gulack* 217 USPQ 401 (Fed. Cir. 1983) and *In re Ngai* 70 USPQ2d 1862 (Fed. Cir. 2004). Applicants address each of these rejections as follows.

### Claim Amendments

Claim 1 has been amended to feature a computer containing a processor in communication with a memory stored with at least one set of x, y, and z atomic coordinates from Table 5, or a mathematical modification of Table 5 that preserves the relative relationships among the coordinates of Table 5. Support for this amendment is

found, for example, in Table 5 on page 95, of the specification as filed. Claim 1 has further been amended to feature atomic coordinates of a Polo-box domain of a Plk-1 Polo-like kinase. Support for this amendment is found, for example, on page 32, lines 6-13, of the specification as filed. Claim 1 has also been amended to feature a program for generating a three-dimensional model of the Polo-box domain utilizing the coordinates of Table 5 and outputting the model to a display or memory. Support for this amendment is found, for example, in the drawings submitted with the application as filed and on page 167, lines 7-14, of the specification as filed. Claims 39-42 have been amended to feature a memory having stored therein at least two, three, four, or five sets of x, y, and z atomic coordinates, respectively, or sets of x, y, and z atomic coordinates for a given atom that preserve the relationships among the coordinates. Support for these amendments is found, for example, on page 7, lines 25-29, through page 8, lines 1-7, of the specification as filed.

No new matter has been added by the present amendment. Applicants reserve the right to pursue any cancelled subject matter in this or in a continuing application.

#### Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1 and 39-44 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner states (page 3) that “[i]t is unclear from claim 1 (claims 39-44 dependent therefrom) as to the scope of atomic coordinates that are encoded on the

data storage medium... [because] there is no limitation in part (i) of claim 1 that limits the selected coordinates to being the coordinates of a 3-D model of a Polo-box domain.” To expedite prosecution, Applicants have amended part (i) of claim 1 to feature at least one set of x, y, and z atomic coordinates from Table 5, or a mathematical modification of Table 5 that preserves the relative relationships among the coordinates of Table 5, from a given atom of each of residues His-538, Lys-540, Trp-414, and Leu-491 of a Polo-box domain of a Plk-1 Polo-like kinase. Additionally, part (ii) of claim 1 had been amended to feature a program for generating a three-dimensional model of a Polo-box domain of Plk-1 Polo-like kinase utilizing the coordinates of part (i). Thus, in view of the present amendment to claim 1 and claims dependent therefrom, the rejection under 35 U.S.C. § 112, second paragraph, may now be withdrawn.

#### Rejections Under 35 U.S.C. § 112, First Paragraph

##### *Written Description*

Claims 1 and 39-44 stand rejected under 35 U.S.C. § 112, first paragraph, for lack of written description. The Examiner states (page 5) that the term “surrogate” has been interpreted as meaning “substitute,” as evidenced by a dictionary definition of the term. To expedite prosecution, claim 1 has been amended to remove the term “surrogate” and to feature at least one set of x, y, and z atomic coordinates from Table 5, or a mathematical modification of Table 5 that preserves the relative relationships among the coordinates of

Table 5. One skilled in the art would understand that the coordinates from Table 5 could be mathematically modified in such a way as to preserve the relative relationships between the coordinates (e.g., by rotational or translational modification), resulting in the generation of an equivalent three-dimensional structure of a Polo-box domain of a Plk-1 Polo-like kinase.

The Examiner also states (page 5) that claim 1 “has been broadly, but reasonably interpreted as a single x, y, or z coordinate for only a singly atom of each of H-538, K-540, W-414, and L-491 from Table 5.” Claim 1 as amended features at least one set of x, y, and z atomic coordinates from Table 5 for each of H-538, K-540, W-414, and L-491. The Examiner further notes (page 7) that “the genus of claimed computers encompasses species that are widely variant with respect to the structural coordinates that are stored thereon, representing the three-dimensional structures of essentially any polypeptide having any function, including polypeptides that are structurally and functionally unrelated to the Polo-box domain of Plk-1.” As amended, claim 1 features the coordinates of Table 5, or any mathematical modifications of Table 5 that preserve the relative relationships among the coordinates, from a given atom of each of residues His-538, Lys-540, Trp-414, and Leu-491 of a Polo-box domain of a Plk-1 Polo-like kinase. Accordingly, the rejection of claims 1 and 39-44 under 35 U.S.C. § 112, first paragraph, for lack of written description, may now be withdrawn.

### *Enablement*

Claims 1 and 39-44 stand rejected under 35 U.S.C. § 112, first paragraph, for insufficient scope of enablement. Regarding the breadth of the claimed invention, the Examiner states (page 9) that “[t]he claim does not require all atomic coordinates from each of H-538, K-540, W-414, and L-491 from Table 5...” To expedite prosecution, claim 1 has been amended to feature a computer with a processor in communication with a memory with at least one set of x, y, and z atomic coordinates from Table 5, or a mathematical modification of Table 5 that preserves the relative relationships among the coordinates of Table 5, for each of H-538, K-540, W-414, and L-491. Applicants submit that amended claim 1 and claims dependent therefrom are commensurate in scope with the specification as filed.

Likewise, the working example and guidance provided by the specification as filed are enabling for amended claim 1. The Examiner states (page 10) that the “single working example along with the general disclosure of the specification and the state of the prior art, fail to provide the necessary guidance for making the full scope of the claimed computers, which encompass atomic coordinate data of essentially any macromolecule.” Applicants submit that the guidance and working example provided by the specification as filed adequately describe and enable the generation of a three-dimensional model of a Polo-box domain of a Plk-1 Polo-like kinase.

The Examiner also states (page 11) that “the specification fails to provide guidance

for successfully making and using all homology models as broadly encompassed by the claims in accordance with the asserted utility of the claimed invention for identifying modulators of Plk1.” The Examiner cites the teachings of Flower (“Drug Design, Cutting Edge Approaches,” Royal Society of Chemistry, Cambridge, U.K., 2002) and Lambert et al. (U.S. Patent Application Publication No. 2004/0137518; herein “Lambert”). As an initial matter, claim 1, as amended, features a program for generating a three-dimensional model of a Polo-box domain of a Plk-1 Polo-like kinase utilizing the coordinates of Table 5, or mathematical modifications of these coordinates that preserve the relative relationships among the coordinates. Thus, the atomic coordinates and structure generated therefrom of amended claim 1 would enable one of ordinary skill in the art to identify modulators of Plk-1.

Turning to the teachings of Flower and Lambert, the Examiner notes that Flower describes problems associated with using homology models in the rational design of drugs. Flower, however, also teaches (page 25) that, when a protein structure has been generated through homology modeling, “one can dock small or large molecules... or one can perform some kind of atomistic simulation leading, in turn, to the investigation of thermodynamic properties, principally binding.” Thus, Flower teaches that homology modeling is “a well-established technique” that can be useful in the identification of molecules that bind to a given protein. The Examiner also asserts that Lambert teaches that homology models may not provide the necessary degree of specificity for designing

PPAR modulators. Applicants direct the Examiner's attention to Lambert (page 17), which states: "[T]he structure coordinates of a crystalline PPAR $\alpha$  [ligand-binding domain] LBD can be used to design compounds that bind to a PPAR LBD (more preferably a PPAR $\alpha$  LBD) and alter the properties of a PPAR LBD..." The teachings of Lambert suggest that the PPAR $\alpha$  structure may serve as a model for any other PPAR subtype for the purpose of identifying compounds that alter PPAR activity. As such, Applicants submit that the teachings of Flower and Lambert do not dismiss homology modeling as a means of identifying modulators of a given protein.

With respect to the quantity of experimentation required, the Examiner states (page 13) that "it was not routine at the time of the invention to generate the atomic coordinates of any molecule or molecular complex as broadly encompassed by the claims..." Applicants submit that claim 1, as amended, would not have required undue experimentation at the time of filing. With the specification in hand, practicing claim 1, as amended, would have been routine to one of ordinary skill in the art. Thus, in view of the present amendment to claim 1 and claims dependent therefrom, the rejection under 35 U.S.C. § 112, first paragraph, for insufficient scope of enablement may now be withdrawn.

#### Rejection Under 35 U.S.C. § 102(b)

Claims 1 and 39-44 are rejected under 35 U.S.C. § 102(b) for lack of novelty over

the '740 patent. The '740 patent teaches the atomic coordinates for a nitrogen atom of a His residue, the atomic coordinates for a nitrogen atom of a Lys residue, the atomic coordinates for a nitrogen atom of a Trp residue, and the atomic coordinates for a nitrogen atom of a Leu residue. The Examiner states (page 14) that “the claims are not so limited as [to] require ‘one or more coordinates from Table 5 *for each* of... His-538, Lys-540, Trp-414, and Leu-491,’ but instead encompass ‘surrogate’ coordinates, which... have been broadly, but reasonably interpreted as substitute coordinates...” To expedite prosecution, the claims have been amended to feature at least one set of x, y, and z atomic coordinates from Table 5, or a mathematical modification of Table 5 that preserves the relative relationships among the coordinates from a given atom of each of residues His-538, Lys-540, Trp-414, and Leu-491 of a Polo-box domain of a Plk-1 Polo-like kinase. Thus, in view of the present amendment to claim 1 and claims dependent therefrom, the rejection under 35 U.S.C. § 102(b) may now be withdrawn.

#### Rejection Under 35 U.S.C. § 103(a)

Claims 1 and 39-44 stand rejected under 35 U.S.C. § 103(a) over the '740 patent in view of *In re Gulack*, 703 F.2d 1381, 217 USPQ 401 (Fed. Cir. 1983) and *In re Ngai*, 367 F.3d 1336, 70 USPQ2d 1862 (Fed. Cir. 2004). The Examiner states (page 16) that “the atomic coordinate data of Table 5 is ‘a compilation or mere arrangement of data’ and there is no functional interrelationship between the data of Table 5 and the computer upon



which it is stored.” Applicants respectfully disagree.

As an initial matter, Applicants submit that the Examiner mischaracterizes the teachings of *Gulack*. In *Gulack*, the device claim at issue features three components: a band or ring, a plurality of digits imprinted on the band (“printed matter”), and an algorithm for generating the digits. The Court acknowledges that a functional relationship exists between the band and printed matter, stating:

Under section 103, the board cannot dissect a claim, excise the printed matter from it, and declare the remaining portion of the mutilated claim to be unpatentable. The claim must be read as a whole. (*Id.*, 703 F.2d at 1365)

In addition, the Federal Circuit recites additional criteria for patentability, stating that “the critical question is whether there exists any new and unobvious functional relationship between the printed matter and the substrate” (*Id.*, 703 F.2d at 1386).

Applying the teachings of *Gulack* to the present invention, it is improper to excise the atomic coordinates from claim 1, determine them to be “nonfunctional descriptive material,” and declare the claim as a whole to be unpatentable. The generation of the three-dimensional protein structure of the present invention is a function of the computer acting upon the claimed atomic coordinates stored in its memory and outputting the coordinates in the form of a novel and useful model. Thus, a new and nonobvious functional relationship exists between the computer and coordinates.

Turning to *Ngai*, the Federal Circuit held that “a set of instructions into a known kit does not interrelate with the kit in the same way as the numbers interrelated with the band” (*Id.*, 367 F.3d at 1336). The Court further notes:

In *Gulack*, the printed matter would not achieve its educational purposes without the band, and the band without the printed matter would similarly be unable to produce the desired result. Here, the printed matter in no way depends on the kit, and the kit does not depend on the printed matter. (*Id.*, 367 F.3d at 1336)

Using the same logic as presented by the Court in the *Ngai* opinion, the atomic coordinates of the present invention would not achieve their purpose (e.g., educational or industrial) without the computer outputting a representation of the structural model, and the computer without the atomic coordinates would similarly be unable to produce the desired result. Thus, in view of the present amendment to claim 1 and claims dependent therefrom, the rejection under 35 U.S.C. § 103(a) may now be withdrawn.

CONCLUSION

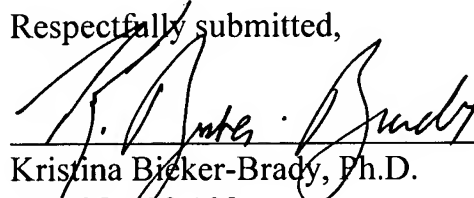
Applicants submit that the application is now in condition for allowance, and such action is hereby requested. Enclosed is a Petition to extend the period for replying to the Office Action for one month, to and including December 6, 2007, and a check in payment of the required extension fee.

If there are any additional charges or any credits, please apply them to Deposit Account No. 03-2095.

Date:

December 5, 2007

Respectfully submitted,

  
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